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**Department of Mechanical and Mechatronics Engineering**

**College of Engineering**

**University of Salahaddin**

**Subject: Mathematics II**

**Course Book- 1st year students – Semester 2**

**Lecturer's name: MS. Khatoon Y. IbrahimMSC**

**Academic Year: 2022/2023**

**Course Book**

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| **1. Course name** | Mathematics II |
| **2. Lecturer in charge** | Ms. Khatoon Yaseen Ibrahim |
| **3. Department/ College** | Mechanical –Mechatronics Eng. Dept. / College of Engineering |
| **4. Contact** | e-mail: Khatoon.Ibrahim@su.edu.krdTel: (optional) |
| **5. Time (in hours) per week**  |  Theory: 3 Tutorial: 1  |
| **6. Office hours** |  |
| **7. Course code** | 108 |
| **8. Teacher's academic profile**  | MSc in Composite Materials  |
| **9. Keywords** | Derivatives, Applications of Derivatives Integration, Applications of Integration, Area, Length, Volume, Techniques of Integrations. |
| **10. Course overview:**In this section the lecturer shall write an overview about the subject he/she is giving. The course overview must cover:* Definition of Derivatives.
* Derivative of different functions.
* Derivative of higher orders.
* Application of derivatives.
* Integration; indefinite integration, definite integrals and its applications.
* Area between two curves and volume of revolution.
* Distance and length of a curve.
* Techniques of integrations.
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| **11. Course objective:**An engineering student needs to have some basic mathematical tools and techniques which emphasize the development of rigorous logical thinking and analytical skills. The course is aimed at developing the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. Topics include definition of derivatives and applications of derivatives, definition of integration as the reverse of differentiation and learn to solve problems include definite integration as the area under the curve, volume and length of curves. Apply techniques of integration to solve engineering problems.  |
| **12. Student's obligation** The attendance of students at all lectures is required since being absent from class will inhibit student’s ability to fully participate in class discussions and problem solving sessions and will therefore affect his/her grade. The student is required to continuously submits homework and assignments and expect quizzes any time. |
| **13. Forms of teaching*** Power point presentations for the head titles, definitions and graphs.
* Elaborations and explanations of the subjects, analysis and derivation for necessary equations, solution of examples and problems on white board.
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| **14. Assessment scheme**‌ The final grade in this course will be determined as follows:‌ Midterm Examination 20 % Course work and assignments 20 % Final Examination 60 %\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Total Marks 100% |
| **15. Student learning outcome:**At the end of the course, students will be expected to :* Find derivative of different functions.
* Solve problems include applications of derivatives.
* Understand Indefinite and definite integrals.
* Students will be able to use various integration techniques to obtain anti-derivatives without an integral table or calculator.
* Calculate area under the curve and areas bounded between two curves.
* Integration of trigonometric functions.
* Application of definite integrals; area between two curves, distance and length of a curve.
* Calculate volume generated by revolution of area about an axis.
* Solve problems involving properties of matrices and determinants.
* Determine area between two curves in polar coordinates.
* Find the length of curves in polar coordinates.
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| **16. Course Reading List and References‌:**1. Calculus, International Edition, By Thomas’, 2005.
2. Thomas’ Calculus 12th edition, Thomas, Weir and Hass, Pearson Addison Wiley, 2010.
3. Calculus, 2nd edition, Steven G. Krantz McGraw Hill, 2011.
4. Essential Calculus, 2nd Edition, James Stewart, 2012.
5. Calculus, 11th Edition, By Thomas’, 2013.
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| **17. The Topics:** | **Lecturer's name** |
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| **Week** | **Hours** | **Topics** |
| **1** | **4** | **Derivatives** |
| Definition |
| Derivative of Composite functions |
| **2** | **4** | Derivative of Trigonometric Functions |
| Derivative of Inverse Trigonometric Functions |
| Derivative of Hyperbolic Function |
| Derivative of Inverse Hyperbolic Function |
| **3** | **4** | Derivative of Exponential and Logarithmic Function |
| **Application of Derivatives** |
| Application of differentiation- tangent and Normal equations |
| **4** | **4** | L' Hapital rule |
| The Chain Rule |
| Second and Higher Order Derivative |
| **5** | **4** | Implicit Function Differentiation |
| Derivative of Composite functions |
| Derivative of Trigonometric Functions |
| **6** | **4** | **Introduction to Integration** |
| Integration as reverse ofdifferentiation- by observation |
| **7-10** | **12** | **Indefinite Integration** |
| Integration of logarithmic Functions |
| Integration of exponential functions |
| Integration of trigonometric functions |
| Integration of inverse trigonometric functions |
| Integration of hyperbolic functions |
| Integration of inverse hyperbolic functions |
| **11-12** | **8** | **Techniques of Integration** |
| Basic Integration formulas |
| Integration by parts |
| Integration partial fractions |
| Trigonometric Integrals |
| **13-14** | **8** | Definite Integral |
| Area between two curves |
| Distance and length of a curve |
| Area of Surface of Revolution |
| **15** | **4** | **Volumes** |
| **Final Examination** |

  | Ms. Khatoon Yaseen Ibrahim |
| **18. Practical Topics (If there is any)** |  |
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| **19. Examinations:*****1. Compositional:*** ***2.******True or false type of exams:******3. Multiple choices:***. |
| **20. Extra notes:** |
| **21. Peer review پێداچوونه‌وه‌ی هاوه‌ڵ** .‌‌  |